

ABSTRACT OF THE DISCLOSURE

Methods and apparatus for depositing low dielectric constant layers that are resistant to oxygen diffusion and have low oxygen contents are provided. The layers may be formed by exposing a low dielectric constant layer to a plasma of an inert gas to densify the low dielectric constant layer, by exposing the low dielectric constant layer to a nitrating plasma to form a passivating nitride surface on the layer, or by depositing a thin passivating layer on the low dielectric constant layer to reduce oxygen diffusion therein. The low dielectric constant layer may be deposited and treated *in situ*.